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REPORT ON IRRIGATION

IN THE

ISTIMRARI ESTATES

OF THE

AJMER DISTRICT,

BY

THE SUPERINTENDING ENGINEER FOR IRRIGATION
IN RAJPUTANA.

1904.

AJMER:
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1904.

INDEX.

REPORT ON IRRIGATION IN THE ISTIMRARI AREA OF THE AJMER DISTRICT.

Area and Number of Istimrari Estates.

1. There are 66 Istimrari Estates in the Ajmer District, with a total area of 819,523 acres, or about $\frac{1}{6}$ths of the whole area of the district.

2. The estates vary much in size, but include in all 240 villages, as compared with 190 in the remainder of the district.

3. The largest of the estates, with the numbers of their villages, are given below, the majority of the remainder possessing only one village each :—

	Villages
Masuda	26
Bhinai	23
Sawar	21
Kharwa	15
Junia	14
Pisangan	11
Bandanwara	9
Mehron	8

Revenue.

4. The Istimrardars are holders of their estates at a fixed and permanent quit rent, the total Revenue realized per annum, which varies for each estate, being Rs. 1,14,734.

Tanks and Nadis in Istimrari Area.

5. From the list prepared in 1877, the only record existing, it appears there were then 1,353 tanks and nadis in the Istimrardars' Estates, which had been constructed at an original estimated cost of Rs. 14,58,659, or, including cost of repairs executed up to that year, a total cost of Rs. 17,34,757.

These tanks are estimated to irrigate in ordinary years—

Kharif.	Rabi.	Acres.
11,744	8,604	20,348

and to yield a water revenue, either fixed or ordinary leviable, of

Kharif.	Rabi.	Rupees.
Rs. 8,188	Rs. 5,243	13,431

which is only $\frac{3}{4}$ per cent. profit on the capital cost.

6. Since 1877 two famines have occurred in Ajmer, *viz.*, in 1890-91, and 1899-1900, and the Relief Works carried out by the Istimrardars consisted chiefly in enlarging and strengthening their tanks and building new ones. From figures given me by the Revenue Extra Assistant Commissioner it would appear that between the years 1877-1891, Rs. 2,58,850 have been advanced on loans to the Istimrardars and spent by them on Irrigation Works, and if we assume that they have also spent a sum equal to $\frac{1}{4}$th of the loans advanced from their private funds, we have a total of Rs. 3,23,562 as having been spent; and probably 100 new tanks and nadis have been constructed in that time; but no accurate record has been kept.

Accepting these figures, the total number of tanks and nadis now existing in the Istimrari area may be taken as 1,450, and the total expenditure incurred on the same, including original cost of construction, as Rs. 20,58,000.

7. The above figures show that the Istimrardars thoroughly appreciate the value of Storage Tanks and Irrigation, and that all have carried out works to the best of their ability and as far as their means permitted for the benefit of their estates.

In fact, most that can be done has been carried out, and the number of new projects is now limited.

Drainage Areas Inspected.

8. The accompanying Map shows the portion of the Ajmer District comprising the Istimrari area, with the main drainage areas passing through the same.

All that has been done in the present investigation was to inspect each of these drainage areas, and note what had been carried out on each. What more was possible? The result is noted below.

Distribution of water interfered with by boundaries of small Estates.

9. The division of the district into petty estates does not contribute to the best distribution of water, as there is a natural tendency for each landlord in carrying out works to consider only his own interests, without reference to the effect on estates below; while other projects cannot be carried out owing to the limits of boundaries, unless a mutual agreement between neighbouring estate holders can be effected, and in this there are difficulties.

Sagarmati River.

10. *Sagarmati River* (See Plan No. 1, Drainage Area No. 1)—This enters the Pisangan Estate after it has run 17 miles of its course through the British area of the District, and, taking a northward turn past Pisangan and Govindgarh, passes into Marwar, after flowing for 11½ miles in the Istimrari area. There are a great number of wells on either side the river which receive percolation from it all along its course to Pisangan and again near Govindgarh, but nothing is possible in the way of storage on the river itself.

About half a mile below Govindgarh itself there is a natural rock crossing (Site No. 1) where a weir could be constructed at little cost to hold up water for the benefit of the wells above. The weir would only be about 175 ft. in length, to fill up a gap between the rocks which rise on either side; and although there is no land below, it is thought it would be worth carrying out. The Thakur Sahib thinks it will be of doubtful advantage, and is not therefore inclined to carry it out.

11. On the main tributary to the Sagarmati, which enters Pisangan just below the village of Kalesara and joins the left bank of the Sagarmati at Pisangan, there are also good rocky crossings for the construction of weirs, which would hold up water for the benefit of the wells on the right bank, and to irrigate the land on this bank by lift.

12. On the left bank a great portion of the land is reserved for grass, and the remainder is irrigated from two tanks, one at Batsuri,

the overflow of which passes into a large shallow tank between Batsuri and Naid, the dam of which is about 2 miles long (Site No. 2).

Propcsed Tank at Fatehpura.

13. On the right bank there are several nullahs rising in the hills, the water of which spreads over the land, which is here sandy, before reaching the river itself. On one of these, which rises at Sawaipura, a storage reservoir could easily be formed at little cost near Fatehpura village at a point (Site No. 3) where the water, after spreading over the country into a natural basin, has cut its way through the ridge.

This gap should be filled up and a cut made above to take the overflow down to a tank formed on the next nullah by the Thakur of Sethon (Site No. 4). This tank is an old one, but was raised and enlarged during the late famine, and does not now fill from its own catchment.

This is a case where two estates should work together for each other's benefit; and as the Assistant Commissioner has informed me that Pisangan wishes surveys to be made as proposed, it is presumed that this has been agreed to.

Sartsuti River.

14. *Sarsuti River* (See Plan No. 1, Drainage Area No. 2)—This river, which drains the Pushkar valley, enters the Istimrari area 4 miles north-west of Govindgarh, and passing that town joins the Sagarmati just above the Marwar border, the two forming the Luni River. It is a river with a broad sandy bed, running here between high sandy banks; nothing could be done with it, except at enormous cost, and there is no land below available for irrigation. This river is said to benefit the percolation of the wells near Govindgarh considerably.

Richmalia Nullah.

Pagaria Tank.

15. On the Richmalia Nullah (See Plan No. 1, Drainage Area No. 3), a tank was built in 1896 at Pagaria (Site No. 5) by Pisangan. The dam is about 1 mile in length, and has a masonry face fall, backed with earth, which is at present very weak in section. It was originally built with a weir 134′ in length and 2′ 3″ below the top of dam, but the dam breached, and a new weir at the east end has since been built, 95 ft. in length and 6′ 10″ below the top of dam. The tank has a catchment area of 10 sq. miles and fills quite easily, and Pisangan is anxious to raise the weir and dam.

Surveys have been taken to allow plans and estimates to be worked out properly, which will now be done. Apparently the work has so far been carried out without any definite plan, but Rs. 25,000 have, I am told, been spent on the work.

The site is a good one and the tank should be properly finished off. There is land below for irrigation, and the bed itself can all be cultivated as the water recedes.

Sites for Weirs at Richmalia

16. Lower down at Richmalia (Site No. 6) the Thakur showed me a site for a dam, which is a good one, but unfortunately the land on the right bank he wishes irrigated is very high, and the project would

not pay. There are, however, good rocky sites in the nullah for building weirs, one just below the village; and these should be carried out to hold up water for lift irrigation.

17. The Thakur also showed me another site to the north-east of the village (Site No. 7) where three nullahs meet, but this would be an expensive project. There is no land below, and the basin which is a bad one with high land in it, would alone be benefited, so the project is not recommended.

Gopal Sagar at Kharwa.

18. *At Kharwa*, the Gopal Sagar was commenced in 1900 and is still incomplete. The tank is in the catchment of an older tank, the Rani Sagar, which fills easily, and the Gulab Sagar is intended to irrigate higher land at present lying idle, and water can also be passed down to the Rani Sagar if required.

The work done so far consists of a dam 1,150 ft. long with face-wall 3 ft. thick and 11 ft. above nullah bed, connecting a small hill with the range on the south through which the nullah flows, and on the north of the small hill an earthen dam has been commenced.

It is proposed to raise and continue this earthen dam till the range on the north is reached and also to raise and complete the south portion of the dam.

No surveys or estimates had been prepared, and this has now been done, and the detailed plans and estimates for completing the work will be prepared.

The tank has a catchment of 2¼ sq. miles all hilly, and will be made capable of storing 250 m. c. ft., sufficient to irrigate 2,500 acres.

Masuda Nullah.

19. *Masuda Nullah* (See Plan No. 2, Drainage Area No. 4)—This large nullah rises in the south-east slopes of the Aravellis, and after flowing for 25 miles in a south-east direction, joins the left bank of the Khari at Nagar, and drains with its tributaries an area of 204 sq. miles.

Weirs at Masuda.

20. On this nullah Masuda has built two weirs close to and west of Masuda itself for the benefit of wells, and to divert water into the "Bara Talao."

Bhagwantpura Tank.

21. A third weir has also been constructed south-east of Masuda, with a cut to divert water into the Bhagwantpura Tank (Site No. 1). This tank has an earthern dam about 1 mile in length; originally a small nadi, it was raised and extended during the late famine. The earth is unsuitable for dam construction, consisting of moorum and kunkar, and the dam is also at present too weak in section. A face-wall should be constructed and the earth strengthened, otherwise it is bound to breach.

I was informed by the Masuda Overseer that an estimate had been prepared for this, amounting to Rs. 10,000, but that all work was stopped owing to the Rao of Masuda's death.

This work should, however, be carried out, as the Bhagwantpura Tank commands a large area of good land and the bed itself is excellent for cultivation. The supply cut from the weir, which is 14 ft. wide, should be enlarged and deepened, but as this would entail heavy rock cutting, it would probably be cheaper to raise the weir 2 ft.

Weirs at Jaisingpura and Lodiana.

22. Lower down the nullah at Jaisingpura (Site No. 2), Masuda has built another weir across the nullah for the benefit of wells, and again below Lodiana (Site No. 3) with the same object. This result has been obtained, but the Thakur of Satana, whose estate is next below, states that these weirs built by Masuda have stopped the percolation into his wells.

Proposed Feeder to Tanks at Satana.

23. The Thakur of Satana has two tanks, one a very large one, with a bund with face-wall backed with earth over 1 mile long. This tank does not fill from its own catchment of about 2 sq. miles. and he is anxious to build a weir across the Masuda Nullah, just within his own boundary, from which a supply cut would be taken to the tank.

This weir would be about 500 ft. below Masuda's weir at Lodiana, and from levels taken sufficient head will not be secured at this point to carry out his proposal. The crest of Masuda's weir is 2 ft. above the weir level of Satana's tank, and arrangements should be made for Satana to be allowed to raise Masuda's weir, say 3 ft. and to strengthen it, and to take his cut direct from this weir, the bed of the cut to be the same level as the present level of Masuda's weir.

By this arrangement Masuda would have the same quantity of water held up as at present, and this is all he requires, as there is no land below his to irrigate, and the top 3 ft. would be diverted into Satana's tank, the weir of which would be raised 1 ft., and from this the overflow would pass into Satana's tank No. 2. It is a good project, as Satana has plenty of land below his tanks for irrigation ; and it cannot possibly injure Masuda beyond the excavation of the canal for a few hundred feet within his estate, and it would compensate Satana for the damage done to his wells by the construction of Masuda's weirs. The Assistant Commissioner has asked for the necessary plans and estimate to be prepared for carrying out this proposal ; so it is hoped the two estates have agreed to work together in the matter.

Feeder to Burli Tanks.

24. Just below Nagar, and above the junction of the Masuda Nullah with the Khari, where the Nagar and Burli estates join, the Thakur of Burli is anxious to construct a weir across the nullah (Site No. 4), with a cut to supply tanks near Burli, a mile away. The cut was commenced, but Nagar objects to the construction of the weir on the ground that a portion of his cultivated land will be submerged. The case has been the cause of much correspondence and is still unsettled.

Tank at Sukrani.

25. Three miles above Nagar the chief tributary of the Masuda Nullah joins it on the left bank. This nullah rises in the hills north-west of Mathania, and flows in a south-east direction for 9 miles.

It is fully utilized on the way, tanks having been constructed at Mathania (Site No. 5) and again above Sealia (Site No. 6), a large tank belonging to the Thakur of Burli, and finally at Sukrani (No. 7).

This was constructed in the famine and has a very long bund; starting on the east by the hill at Sukrani village, it curves round, ending on the west, parallel to the railway. The dam consists of earthwork, except for the portion where it crosses the nullah, where a face-wall with buttresses has been provided. The earthwork is too weak in section, 7½ ft. wide at top and front and rear slope 1½ to 1. This should be re-made with the front slope 3 to 1 and rear slope 2 to 1.

The weir is 115 ft. in length, of very inferior masonry, and the foundations do not appear to be on rock, though beyond there is good rocky land for the overflow, which passes away back into the Masuda Nullah. The dam breached last rains on the north of the weir; this should be rebuilt to proper section and made 465 r ft. long to pass the maximum discharge from its 10 sq. miles of catchment, with a 2 ft. head, as top of dam is only 4 ft. above weir level. The whole bed of the tank is cultivated as the water recedes, and there is land below available for irrigation, so it should prove a remunerative Irrigation work and should certainly be completed properly.

Proposal for Feeder to Ratakot Tanks not approved.

26. The Thakur of Bandanwara has a proposal for diverting the water of the west branch of this nullah above Mathania (Site No. 8) to his tanks at Ratakot. I inspected this at his request, but I do not believe it is feasible. There is a high ridge between which would entail deep cutting, and even then the weir across the stream would have to be made very high, and with the small catchment would probably not fill to required height. Even if feasible the cost would be prohibitive.

The proposal is also objectionable, as it interferes with the catchment of the Mathania and Sealia Tanks below.

Feeder from Khari River.

27. *Khari River* (See Plan No. 2)—After much enquiry and correspondence on the proposal for a canal from the site selected for a weir across the Khari River at the village of Garur in Mewar, it was, in August 1877, finally decided by the Chief Commissioner that the project had proved to be an impracticable one. The Consulting Engineer for Irrigation, however, considers that "although the construction of a permanent weir at Garur had to be abandoned, still it might be possible to do something with this large river, by taking a large cut from it, starting flush with the bed of the river, so as to ensure part of the flood supply reaching lower ground, where it might perhaps be stored either in existing or in new tanks; doing in fact, on a large scale, what the Rao of Masuda has already done at this place in a small way to supply water to his two or three tanks, distant about 3 miles from the river." Surveys have therefore been made with this object, for 20 miles in length, starting just below Garur in Masuda territory, following the line of the existing cut at first; and the accompanying plan shows the line the cut would follow, with a fall of 2 ft. per mile. The following existing tanks would be com-

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manded on the way, and overflows would be provided in the canal for their supply; and if wished the tanks could be raised and strengthened to increase their capacity.

(1) At Kesarpura.
(2) Lodiana.
(3) Satana.
(4) Sakrani.
(5) Burli.

New tanks could be constructed at (1) Khoontia two tanks; (2) Lodiana, (3) Satana.

Supposing the cut was made with a bed width of 30 ft. at first, and 3 ft. deep, the earthwork would cost about Rs. 1,800 per mile, or Rs. 36,000 for the 20 miles say Rs. 55,000 with masonry work for overflows, crossings of nullahs, etc.

On the Khari a groin could be constructed with boulders, etc., from the rocky crossing above, starting half way across the river and connected with the entrance of the canal, to divert a portion of the flood water down the cut, and the remainder would pass down the main stream for the benefit of percolation to the wells on either side the river below. There is no doubt that such a project would be of great protective value to the Ajmer district. Even in famine years this river runs for a short time, sufficient to ensure the filling of the tanks commanded, and to save the crops they irrigate.

The project will be worked out and printed for record, as, if not carried out before, it would be an admirable relief work should the need arise. The anal could be extended if desired, and the work would be distributed and spread over the district.

Bhinai Nullah.

28. *Bhinai Nullah* (See Plan No. 3, Drainage Area No. 5)—There are two nullahs which rise to the west of Bhinai, one flowing to the north and the other to the south of the Bhinai Hills, and flowing in an easterly direction eventually join about 3 miles west of the Dain River, which they join on the right bank. They drain a total area of 107 sq. miles, and have been made good use of for irrigation.

29. Taking the south nullah, Bhinai has constructed a good tank at Choondia (Site No. 1), also one on a tributary on the left bank at Sobri (Site No 2), and lower down at Burli there is a masonry weir (Site No. 3), with supply cut leading into a very large tank at Burli, the overflow of which passes away on the east into another large tank at Kharia.

Repairs required to Tank at Tilara.

30. About two miles below Choondia, at Tilara, there is an old tank (Site No. 4) which wants repairs, two sluices constructed, and the feeder from the hill on the west, to catch all the surface water and divert it into the tank, set out and made up.

I was told that the tank originally belonged to the village, who gave it up many years ago to the Bhinai Raj, on the understanding that the Raj would keep it in repair, but nothing has been done, and the village suffers in consequence. The tank is situated on too high ground for a

supply cut from the nullah itself, but the repairs noted above should be carried out at once, as there is land below on the east of the dam available for irrigation.

Existing Weirs and Tanks at Jotayan.

31. Below Burli the Thakur of Jotayan has made another weir on the river, with a supply cut on the left bank to a large tank, the Man Sagar (Site No. 5), and he is anxious to build another weir below again to catch the water of the branch nullah which joins the Burli Nullah at Khera (Site No 6), and to make another tank across from the high ground on the N.-E. of his village. Besides bed cultivation, there is grass land below he wishes to irrigate from this tank and bring under cultivation, but he told me he was prevented from constructing the weir by Kishangarh on the ground that it would cut off the supply from their canal to the Sarwar Tanks, the head works of which are a short distance below the junction of this nullah with the dam.

Existing works at Richmalia and Rugnathgarh.

32. The water of the north nullah is also fully utilized. At its head Richmalia has constructed a tank, the dam of which is across the nullah itself (Site No. 7).

Lower down Rugnathgarh has a weir (Site No. 8) across the nullah, with feeder on right bank to his tank, the overflow of which passes with another small tank of his called "Dohra."

Below Rugnathgarh's weir, Jotayan has constructed three weirs on the nullah, the first to a small nadi on right bank, and this and the nadi are both out of repair. The second weir has a cut from it also on right bank (Site No. 9) to supply his "Dhora" tank, which is connected with Rugnathgarh's "Dhora" and receives its overflow, being at a lower level. The third weir (Site No. 10) takes water off on the left bank to "Pionia" Tank, a small tank used both for drinking purposes as well as irrigation, and the Thakur's proposal to form a nadi starting from the high ground on the north of his village across this nullah, will, if carried out, intercept any water that is left.

The Thakur of Jotayan evidently takes great personal interest in his estate, for besides the tanks filled by cuts from the north and south nullahs, he has made a quantity of nadis and field embankments to hold up water in the rains for wheat cultivation, as the soil is "Mal" and most productive if once well saturated.

Dain River.

33. *Dain River* (Drainage Area No. 6.)—The Dain rises in the range of the Aravellis, which runs down from north-east. to south-west of Nasirabad.

There are two branches, each of which runs in a south-east direction for about 18 miles through the British and Istimrari area of the Ajmer district, before they unite at Kesarpura village (Istimrari). The river then continues its course for 8 miles through the Istimrari area, where it passes into the Kishangarh State, through which it flows for 15 miles. It then re-enters the Istimrari area in the Kekri circle for 10 miles, and finally, after passing through the Jaipur State for another 10 miles, joins the left bank of the Banas at Bisalpur, above Rajmahal.

34. Many tanks and weirs across the river with supply cuts, have been constructed both in the British and Istimrari area of the Nasirabad circle, and nothing further appears now possible, except for the Thakur of Bandanwara to construct a weir across the tributary which joins the Niara branch at Bagrai, just below the bridge on the Bandanwara Road, and take a feeder from it to his tank at Surajpura. This has been surveyed and will now be worked out and estimated. Feeder to Surajpura Tank at Bandanwara.

35. At Kesarpura, where the two branches meet, there is a good site for a weir, rock cropping up across the beds of both streams and forming a natural weir between them. Levels were taken to see if a supply cut could not be taken to supply existing tanks at Sarana and Ganeshpura, but the former is at too high a level, and it would not be worth the expense of construction for Ganeshpura alone, so the idea must be abandoned. Site at Kesarpura.

36. The Sarana Tank is a good one, but requires repairs, and should be extended to include the nullah at the north end. This formerly used to be included, but the dam at this end has breached and never been repaired, as the remaining portion of the dam is too weak in section, and frequently breaches when it fills rapidly. Repairs to Gopal Sagar at Sarana.

Surveys will be made and an estimate prepared for carrying out what is necessary, as there is plenty of good land below, at present uncultivated, and it would pay the Thakur well to have the tank put into thorough order.

37. The Thakur of Bandanwara has also a proposal for constructing a tank below Chandma, supplied by a cut from the Dain, as there is a good rocky site for a weir across the river in his estate just below Chandma, which he wishes to make use of. Site for Weir near Chandma.

The tank would only be a small one, but Kishangarh would certainly object to the project as interfering with and cutting off a portion of the supply which passes down to the Sarwar tanks from their weir, a few miles below.

38. In the Kekri Circle (see Plan No. 4) there is an excellent site for a weir across the Dain, near Deolia village (Site No. 1), just below where the Kekri-Junia Road crosses the river, a good high ridge of rock, so that very little masonry would be required, and a cut could be taken away on the left bank, where a Storage Reservoir could be formed. Site for Weir at Deolia.

But the Kamdar of Junia informed me that they do not wish to carry this out for fear of stopping percolation in the wells of Lesaria village, one of their richest villages, with a number of good wells.

39. There is another good site where a well might be built below Lesaria and just above Chabaria. This would hold up water and benefit the Lesaria wells, and the weir would be 700 ft. long, about 5 ft. in height, and should cost about Rs. 2,000. Site for Weir at Chabaria.

40. Nothing else is feasible on the Dain itself in the Istimrari area, but surveys have been made and estimates will be prepared for the following projects in the Junia State on tributaries to the Dain. Feeder and Improvements to Tank in Junia Estate.

On the Right Bank—

(*a*) Feeder to and improvements to the Doralu Tank at Naiki (Site No. 3).

(*b*) Feeder to and improvements to the Kalianpura Tank (Site No. 4).

On the Left Bank—

(*c*) Weir across the nullah at Ambiji-ki-Khera to be connected with existing feeder to the Bara and Dhonia Talabs at Junia; feeder to be enlarged and tank improved (Site No. 5).

(*d*) Supply cut from same weir on left bank to the Dujota Tank at Junia (Site No. 5).

Tributaries on north of Khari.

41. On the south and east of Kekri there are three nullahs tributaries of the Khari passing through the Istimrari area. (See Plan No. 5, Drainage Area No. 7.

(1) The Mundha Nullah.

(2) The Para.

(3) The Pranhera Nullah.

Proposals on Mundha Nullah.

42. The Mundha Nullah takes the surface drainage south-east of Kekri and flows for 6 miles in a south-east direction, when it passes into the Jaipur State.

(*a*) At Mundha, a nadí was constructed during the famine across the nullah (Site No. 1), connected with the village tank, but breaches every year, as the earth-bank is too weak in section, and the earth itself is unsuitable for dam construction. The nadi should be repaired to proper section, *viz.* top width 5 ft.; front slope 3 to 1; rear slope 2 to 1; a sluice should be constructed and weir.

(*b*) Half a mile below Mundha the nullah flows between the Khandola Tank belonging to Junia and the Dhand Tank belonging to Mundha (Site No. 2). The Nullah cuts away the bank of the Khandola Tank, which is in consequence extended into Mundha land.

The two estates ought, of course, to combine and join the two dams, strengthening and raising them and each could irrigate their own land below, which is, however, limited, and also irrigate, on payment of water rates, land belonging to Para at Modkia village, of which there is plenty available.

Proposals on Para Nullah.

43. *Para Nullah.*—This starts at Sirsiri village, 3 miles west of Kekri, and flowing in a south-east direction for 10 miles joins the Pranhera Nullah, between the villages of Ganeshpura and Undri.

The following projects have been surveyed and will be worked out in detail and estimated on this nullah:—

(*a*) Feeder to the Koda Tank, and strengthening and enlarging the tank itself (Site No. 3).

(*b*) Dam across the nullah, about 1 mile above Para, with supply cut to the Khera Tank (Site No. 4).

The soil here is all rich "mal," and several nadis would also be filled by the supply cut on its course to the Khera Tank, and later on the beds of these would all be cultivated with wheat.

Nothing is required below this, as at Ganeshpura there is very good cultivation on both banks of the nullah ; water is only about 15 ft. below the surface, and in good years 12 bighas are irrigated from each well, and even in bad years 4 bighas.

Proposals for Pranhera Tank.

44. *Pranhera Nullah.*—This nullah starts in the Kishangarh State, above Sopan, through which it flows for about 5 miles, when it enters the Istimrari area, about 1½ miles above Pranhera.

It flows in a south-east direction for 16 miles through the Istimrari States, when it passes into Jaipur, and after another 2½ miles joins the left bank of the Khari River.

(1) *Pranhera Project.*—The Thakur of Pranhera began the construction of a dam across this nullah (Site No. 5) during the famine, unfortunately without any plans and estimates, and spent about Rs. 10,000 on the work, which is still incomplete, as the tank (Ranjit Sagar) has breached each year.

Plans and estimates for enlarging the tank were subsequently prepared, amounting to Rs. 63,000, but I inspected the site and proposals, and did not recommend their execution for the following reasons:—

(*a*) The earth of which the dam is formed is most unsuitable, consisting of mixed gravel and sand, and without a core-wall, which would have added to the already very large estimated cost, the dam would not have been safe, and would always have been liable to be breached.

(*b*) Kishangarh had also started in the famine a dam near Sopans on this nullah, which they intend to complete, and this will considerably reduce the amount of water originally estimated as available for storage in Pranhera's Tank.

As the Thakur has spent so much on the work it is only right to complete the project, and to obtain some return for the expenditure, and the dam should be finished off to proper section at its present height, and a weir built, 470 ft. in length, with wing walls at each end to prevent any chance of future failure. The tank will have a capacity of 16 m. c. ft., 160 acres of land below can be irrigated, and the whole of the bed of the tank cultivated as the water recedes.

There is about 1 ft. of black soil overlying the kunkar and gravel strata, so wheat can be cultivated if the land is inundated and saturated. An estimate for completing the work as suggested above has been prepared and will cost Rs. 13,000.

(2) Lower down cuts could be taken from the nullah into the Koas Tanks, but the Thakur does not require this at present, as he says there are not sufficient cultivators to use the water now stored, although there is plenty of good land (mal) available.

(3) The Thakur of Sankria has two tanks.

(*a*) Setola (old tank).

(*b*) Nia Talao constructed in the famine across the branch nullah south of the village (Site No. 7). This has breached, but should be repaired, the dam being strengthened and made to proper section at the same time.

(4) Lower down on this nullah, just before it joins the Pranhera Nullah, arrangements should be made between Gulgaon and Sankria to allow the former to construct a weir and take a supply cut, which would pass for about 400 r. ft. through Sankria's Estate to Gulgaon's Tank, the Deo Sagar (Site No. 8), as this only fills from its own catchment in years of exceptional rainfall. There is no suitable site for a weir across the main nullah itself for the supply cut, and in any case the site would have to be in Sankria's Estate, as levels show that Gulgaon's boundary crosses the nullah where it is too low for the purpose.

Tributaries on south of Khari.

45. On the south of the *Khari* on the two nullahs which come into the Istimrari area from Shahpura, and after their junction flow into the Khari, three large projects are proposed in Shahpura—at Bhimpura on the north nullah, and at Dikola and Baland on the south nullah. The Bhimpura and Dikola projects have been worked out, and will, it is understood, be carried out without delay; and if the Baland project is also carried out later, not much water from these nullahs will be left for the Istimrari estates.

There is a suitable site just above the junction of the nullahs for a dam, but no surveys have been made for the reasons given above, and because the villages interested both above and below the site belong to various Istimrardars; *i.e.*, Mirion is a Charan village, Gordan belongs to Sawar, and Bisundri and Piplaj each have their own Thakurs.

Sawar Estate Ganesh Sagar.

46. *Sawar.* The Thakur of Sawar showed me two projects on which he wanted advice :—

(*a*) An old masonry dam was constructed about 30 years ago to form a tank known as the Ganesh Sagar (Site No. 9), across a gorge between the hills on the west of the range, about 4½ miles north of Sawar.

This dam is 650 ft. long, about 22 ft. greatest height, 3 ft. top and 9 ft. bottom width. It has no earth behind the wall, and is breached for a length of 75 ft.

The masonry wall should be rebuilt across the breach, taken down to rock foundations, and an earth backing given for the whole length of the dam, treating the wall as a face-wall. The weir will be constructed in a gap between the hill on the north side. The tank has a hilly catchment of 1½ sq. miles, so that 17 m. c. ft. of water may be estimated as available for storage. Surveys have been taken, and plans and estimates for completing the project will be prepared.

There are about 600 bighas of land available for irrigation below Ganeshpura.

Nakia Weir and Supply Cut.

(*b*) At Nakia, on the east side of the range of hills, an old weir was constructed for diverting water to the Nadi Tank (Site No. 18). The nullah has cut round the weir and formed another channel for itself.

The weir should be built higher up the nullah, where there is a better site and a supply cut taken into the Khera Tank, from which the overflow will pass by a natural channel into the Nadi Tank and on to two tanks at Kalera. Surveys for this have been prepared and will now be worked out in detail.

List of projects which have been surveyed, and for which estimate and plans will be prepared.

47. As a result of the investigation, the following is the list of projects which have been surveyed in the Istimrari area, and for which estimate and plans will now be prepared :—

SUPPLY CUTS.

(1) Satana Estate.—Supply cut from weir at Lodiana village (Masuda) to two tanks at Satana (para. 23).

(2) Khari River.—Starting from the Khari in the Masuda Estate, just below Garur village (Mewar) and passing for 20 miles through the Istimrari area (para. 27).

(3) Bandanwara Estate.—To Surajpura Tank (para. 34).

(4) Junia Estate.—To Naiki Tank, including repair and enlargement of tank (para. 40 (*a*)).

(5) Junia Estate.—To Kalianpura Tank (para. 40 (*b*)).

(6) Junia Estate.—To Bara, Dhonia and Dujota Tanks at Junia (para. 40 (*c*) and (*d*)).

(7) Koda Estate.—To Koda Tank (para. 43 (*a*)).

(8) Para Estate.—To Khera Tank (para. 43 (*b*)).

(9) Sawar Estate.—To Nadi and Kalera Tanks (para. 46 (*c*)).

Improvements and completion of existing tanks.

(10) Pisangan Estate.—Pagaria Tank (para. 15).

(11) Kharwa Estate.—Golab Sagar (para. 18).

(12) Sarana Estate.—Gopal Sagar (para. 36).

(13) Pranhera Estate.—Ranjit Sagar (para. 44 (1)).

(14) Sawar Estate.—Ganesh Sagar (para. 45 (*b*)).

NEW TANKS.

(15) Pisangan Estate.—Proposed Tank at Fatehpura (para. 13).

Suggestions for improvements of Tanks and Irrigation in the Istimrari Area.

48. Though there is very little left in the way of new works, it is most important, considering how much has been spent (see para. 6), that the existing Tanks and Irrigation Works on which the Revenue of the Istimrardars chiefly depends, should be kept in proper repair, and that all improvements should be carried out at the least cost and to the best advantage. This can only be done by professional assistance and supervision, and at present the Istimrardars have to pay for any help of this kind, all works on which the advice of the Executive Engineer, Ajmer Provincial Division, is given being treated as "contributional," and large percentage charges for establishment being levied. As the majority of the Istimrardars are poor and in debt, this prevents assistance being asked for, with the result, especially in famine time, when they are obliged to afford relief to their tenants, that works are opened without surveys, plans and estimates, and repairs executed without system and professional supervison. In consequence, money, most of which has been borrowed for the purpose, is wasted.

49. My inspection showed that repairs are needed to a very large number of the existing tanks, as nearly all are weak in section, and liable to break at any time; in fact in the majority of cases it would appear that repairs are deferred till a break occurs.

I would recommend that Government be asked to assist the *Istimrardars*, by giving them professional advice and assistance free, and by offering loans to those requiring it, on lenient terms, to induce them to put all their tanks into thorough order.

For supervision, this would mean a competent Irrigation Subordinate attached to the Ajmer Provincial Division in addition to the existing establishment. He would then be directly under the orders of the Commissioner and Executive Engineer, solely for employment in the Istimrari area.

He would work out any new projects or improvements the Istimrardars might suggest, and which were approved after inspection by the Executive Engineer, and he would tour round inspecting and seeing that repairs were properly executed and improvements scientifically carried out. In this proposal there is no wish to interfere with the rights of the Istimrardars, but to help them. The execution of work and repairs and payment for same should be left entirely to the landlords themselves, on the understanding that the instructions of the Executive Engineer, as supervised by the Sub-Overseer, were followed.

By this means useless projects would be avoided and money saved, and what work was done would be properly done, and in the course of time there should be a general improvement in the tanks and system of irrigation from them, tending to a better use of the water and an increase of land irrigated, with its consequent increase of revenue and profit to the estate holders.

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